MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PMT0201 – MATHEMATICS II

(All sections / Groups)

8 March 2016
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of FOUR pages with **FIVE** questions.
2. Attempt **ALL** Five questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Show proper steps and write all your answers in the answer booklet provided.

Question 1 (10 Marks)

a) i) Show that $P\left(\frac{-6}{7},\frac{\sqrt{13}}{7}\right)$ is on the unit circle.

ii) If P is the corresponding terminal point of t, find $\sin t$, $\cos t$ and $\cot t$. [3 marks]

b) Suppose $\sin t = -\frac{2}{5}$ and the terminal point of t is in the Quadrant III

i) Write $\tan t$ in terms of $\sin t$.

ii) Then find the exact value of $\tan t$. [3 marks]

c) Given that $f(x) = 2 + 2\sin\left(\frac{x}{2} + \frac{\pi}{8}\right)$.

i) Determine the amplitude, period, phase shift and vertical shift of f.

ii) Sketch one complete period of $g(x) = 2\sin\left(\frac{x}{2}\right)$.

iii) On the same axes, sketch one complete period of the function f. Indicate clearly the x and y intercepts of the graph. [4 marks]

Question 2 (10 Marks)

a) Find the exact value of

$$\cos\left(\sin^{-1}\left(-\frac{5}{8}\right)\right).$$ [2 marks]

b) A triangle ABC has $b = 32$, $c = 40$ and $\angle A = 39.5°$.

i) Sketch and solve the triangle.

ii) Find the area of the triangle ABC. [4 marks]

c) Show that $(\cot x - \csc x)(\cos x + 1) = -\sin x$. [2 marks]

d) Solve $\sqrt{2}\cos\left(x + \frac{\pi}{5}\right) = -1$. [2 marks]

Continued...

Question 3 (10 Marks)

a) Suppose $z = 1 - i\sqrt{3}$.

i) Find the polar forms of z.

ii) Use De Moivre's Theorem to find z^5. Leave the answer in the standard form $a + bi$ where $a, b \in \Re$. [3 marks]

b) Compute the limits. Show at least one intermediate step.

i) $\lim_{x \to 2} \left[2x + \cos\left(\frac{x\pi}{2} \right) - 2 \right]$

ii) $\lim_{x \to -1} \frac{4x^2 - 4}{x^2 - 2x - 3}$

iii) $\lim_{x \to \infty} \frac{-3x^2 + x}{2x^2 + 5x - 1}$ [4 marks]

c) Suppose

$$f(x) = \begin{cases} 3x - 9, & \text{if } x \leq 4 \\ \sqrt{2x+1}, & \text{if } x > 4 \end{cases}$$

Determine whether f is continuous at 4. Show proper steps. [3 marks]

Question 4 (10 Marks)

a) By using the formal definition of derivative, find $f'(2)$ if

$$f(x) = 4x^2 + 1.$$ [2 marks]

b) Find the derivatives of

i) $p(x) = \frac{x - 3}{\sqrt{3x + 5}}$,

ii) $q(x) = \cos(2x \ln x - 3)$. [5 marks]

c) Find the absolute maximum and minimum values of the function

$f(x) = x^3 - 3x + 4$, $0 \leq x \leq 3$. [3 marks]

Continued...

Question 5 (10 Marks)

a) Compute the integral

$$\int_1^3 \frac{3x^2+4}{\sqrt{x^3+4x}}dx.$$

[3 marks]

b) Use integration by parts to find

$$\int x\cos(3x)dx.$$

[3 marks]

c) Given the parabolas $y=x^2$ and $y=4x-x^2$.

i) On the same axes sketch the graphs and find the points of intersection between the graphs.

ii) Find the area of region enclosed by the two parabolas. [4 marks]

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